



MISSOURI Natural Areas

N E W S L E T T E R

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"...identifying, designating, managing and restoring the best remaining examples of natural communities and geological sites encompassing the full spectrum of Missouri's natural heritage"

Restoring a Forest and Thinking about Land

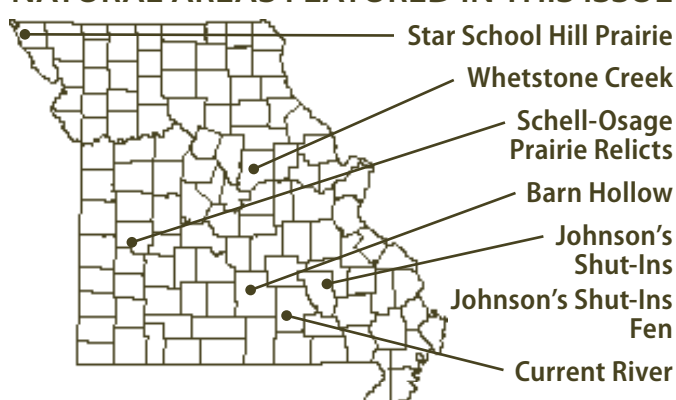
By Greg Iffrig, Liaison to the Board, L-A-D Foundation
and John Karel, President, L-A-D Foundation

Leo A. Drey is one of Missouri's best-known conservationists. Determined, thoughtful, and low-key in his approach, he has achieved monumental results for conservation. His work has been especially important for those interested in sustainable forest management; protecting natural areas, cultural resources, and state parks; and restoring the "Big Woods" landscape of Missouri's Current River watershed. Leo's philosophy has always been that taking good care of a forest means that you also take care of important natural areas, and, together these efforts contribute toward better care for the land.

Acquiring Pioneer Forest. Leo's signature accomplishment is his highly successful effort assembling Pioneer Forest, which started in the 1950s to become nearly 154,000 acres today.

Aptly described by Richard Guyette (in an "in press" paper about Pioneer Forest) as "the heart of roughness," Pioneer's location provides important connections with other public property in the Missouri Ozarks region. With most of its land within the watersheds of the Current and Jacks Fork rivers and more than 30 miles of river frontage, Pioneer Forest provides significant watershed protection for the Ozark National Scenic Riverways. It also serves as the critical land link between the southern boundary of the Mark Twain National Forest's Salem Ranger District, the northeastern flank of the Ozark National Scenic Riverways, and much land owned by the Missouri Department of Conservation.

NATURAL AREAS FEATURED IN THIS ISSUE



Forest Management and Research. Pioneer Forest is a classic-working forest that has practiced the sustainable single-tree selection technique of uneven-aged forest management for more than 50 years. Leo adopted this particular management style, common at the time, and determined that it would be the one Pioneer would follow. Pioneer also established a continuous forest inventory in 1952. Data from this inventory provide the long-term view of the response of the forest to this conservative style of forest management. It turns out that the individual species response has been most positive for white oak and to some extent shortleaf pine, the natural dominant species on these sites, which were also those first selected for cutting beginning in the late 1800s. The data-set, collected every five years, will be 55 years old this year; however, with the average turnover rate for Pioneer Forest's canopy ranging between 189-228 years, there remains much to be learned regarding forest structure and the dynamics of growth over long periods of time. Pioneer remains dedicated to the study and maintenance of the forest as a healthy and enduring ecosystem.

Leo began his involvement with Pioneer Forest in 1951 and in many ways this forest became his workbench for parallel interest in natural areas.

Current River Natural Area: A First for Missouri. As Leo began to acquire properties for Pioneer, natural areas thinking was just beginning to evolve. In the April 1952 issue



On left, Dr. Richard Smith, University of Missouri Forestry Professor Emeritus, and Leo Drey stand against an old white oak on Current River Natural Area at the area's re-dedication in 2005.

L-A-D Foundation, Greg Iffrig

of the *Journal of Forestry*, the Society of American Foresters' Committee on Natural Areas issued a request for locations of virgin forest types. These foresters were beginning their search for specific undisturbed areas, where canopy-forming tree species, such as shortleaf pine, white oak, eastern red cedar, or sugar maple were found. Such a collection of areas was to serve as a comprehensive base of knowledge about the natural developments within virgin forest associations. The intention was to set them aside from the forest management process, to not only protect them, but to study their growth and change over time. Leo's first forest managers, Ed Woods and Charlie Kirk, worked together with the Society of American Foresters (SAF) to designate a 10-acre area of Pioneer Forest as the Current River Natural Area. The July 1955 issue of the *Journal of Forestry* highlighted the negotiations completed between SAF and Leo Drey; the indenture affecting the area's long-term protection and management was recorded on April 13, 1955, in Shannon County. Current River Natural Area on Pioneer Forest was among the very earliest sites proposed for protection.

A few years later Leo and his foresters added a second site on Pioneer to the SAF Natural Areas Program, an old-growth stand of eastern red cedar along the Current River. Leo had clearly come to view protecting Missouri natural areas as complementary to sustained forest management.

By 1960 the SAF had recognized 128 natural areas in 34 states and Puerto Rico. In 1970 the Missouri Department of Conservation began a natural areas program. It was also

during the 1970s that Leo actively began to buy land to save as natural areas. In doing so he worked closely with others from around the state. Interest in natural areas was high but agency funding for acquisition was very limited, and working together produced the greatest good. Leo was among the first from outside the agency to participate, with Clifty Creek in Maries County and The Narrows in Texas County approved as Missouri natural areas in 1971. Other areas followed.

In 1977, Current River Natural Area was brought into the fledgling Missouri Natural Areas System, by then a jointly managed program of the Missouri Department of Conservation and Missouri Department of Natural Resources. Over time, the number of areas in the Missouri Natural Areas System, the participating organizations, and the average size of individual sites all have grown. The original concept has matured and become a huge success.

Current River Natural Area, surrounded by Pioneer Forest, serves as an important reminder of the earlier days of the natural areas movement in Missouri. This area is an anchor, and, as a result of the long view which Leo has always insisted on, has itself grown with the system. In 2005, the 50th anniversary year of Current River Natural Area, a 255-acre expansion to the site was approved by the Missouri Natural Areas Committee and the L-A-D Foundation, which by this time was the property's owner. To allow for better appropriate public access to this natural area, the Missouri Department of Natural Resources' Division of State Parks maintains, via

a lease with Pioneer Forest, the Brushy Creek Trail, which traverses a mile through the natural area. The Brushy Creek Trail is a hiking-only trail.

Establishing the L-A-D Foundation. In 1962 Leo created the L-A-D Foundation, which became responsible for holding title to a diverse array of lands, mostly natural areas in the Ozark region, many of which were recognized by the Missouri Natural Areas Program. As Leo acquired these areas, he would donate them to the L-A-D Foundation. One result of acquiring LaMotte sandstone canyons, natural bridges, old growth forests, petroglyphs, a karst resurgence, and a host of other irreplaceable areas was that Leo became a pillar of strength in helping the natural areas movement in Missouri grow.

The indenture used by Leo in 1955 to assure permanent protection for Current River Natural Area has been replaced by the L-A-D Foundation. The Foundation's mission, to permanently protect and manage lands for their natural and cultural values, proved to be the right vehicle for Leo's great work. The Foundation's portfolio grew to include scenic easement land along the Current and Jacks Fork rivers, two state parks, and nearly a dozen natural areas.

Through the 1990s Leo began to steer the Foundation toward his own larger vision that good forestry and natural areas protection work best together. This convergence has always been among his most important and ambitious goals. In 2004, Leo and Kay Drey donated Pioneer Forest to the L-A-D Foundation. That foundation is dedicated to the continuing integrity and vitality of Leo's resource vision.

No doubt Pioneer Forest and other foundation properties will continue to benefit as more is learned about ecosystem management. One current example is the consideration of fire management on certain Pioneer Forest lands to retain

and further encourage shortleaf pine where it naturally occurs. New approaches will continue to be researched while always following Leo's original vision of protecting and also restoring Ozark lands and forests.

While his quiet manner may sometimes belie the intensity of his resolve, Leo's work always ends up making a big difference. Missouri conservation and especially the state's natural areas system have most certainly been beneficiaries. ▲

Among scientific collectors of Missouri flora, Julian Steyermark tops the list with over 62,000 specimens collected from 1926 to 1988. Other noteworthy collectors were Ernest J. Palmer with 56,000 specimens, Benjamin F. Bush with 35,000, John H. Kellogg with 28,000, and Henry Eggert with 22,000 specimens

Steyermark's *Flora of Missouri*, Volume 1, by George Yatskievych, February 1999

COMMENT FROM THE EDITOR...

This issue includes a broad array of articles, perhaps more so than any of recent years—which makes it an especially appealing issue for me—and I hope also for you. Included are “standard” articles reporting on new natural areas, conservation of natural areas, and other important topics. Also included, though, are articles with a “non-traditional” twist, such as: declassification of existing natural areas, learning history through tree rings, partnerships, geophysiology of springs, and effective monitoring to reach ecological goals. The report on the recovery of Johnson's Shut-Ins State Park discusses the impacts of the breach of the Taum Sauk Reservoir on two natural areas and the efforts to restore them. An article by Adrian Brown offers new perspectives on how we, as a people, might view “natural areas.” Similarly, an article by Greg Iffrig and John Karel offers approaches to managing large private land holdings that incorporate at least two types of natural area classifications, demonstrating both the passion of a private landowner and evolving concepts of natural area classification and management. Perhaps some or all articles in this issue will stimulate thought and conversation among you as readers. Your written comments are welcome.

In the spring 2007 issue of the *Missouri Natural Areas Newsletter*, we invited you to declare whether you would prefer to receive your copy on-line or by postal mail as in the past. So far we have heard from only about 120 of you, and your preference is about 50:50. If you have not already done so, please let us know whether you wish to receive your newsletter on-line via e-mail notification or hard copy via postal service or intra-agency mail so we can best serve your needs and be most cost-efficient. The newsletter can be found at www.mdc.mo.gov/12220 or linked through each of the MoNAC partner-agency websites.

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Reconstructing Relationships with Natural Areas

By Adrian J. Brown, Biogeographer,
The Nature Conservancy

When I was asked to write this essay, I realized that anything written about natural areas would be very much linked to the natural world. What do I mean by the “natural world”? To answer this, look out the nearest window and there it is. We all live in an area, natural or not, that is part of the natural world. For some, I am sure that is probably hard to acknowledge, but put aside the reality of formal natural area designation according to discrete ecological criteria for a moment and think about what a “natural area” might embody for others. Natural areas are a message about our relationship with the natural world, although the message of personal relevance to the natural world has become denigrated to many people.

I advocate a discourse about the natural world that is broad enough to include all “natural areas.” Part of the framework used to broaden the awareness of natural areas is a bigger and wider understanding of how we talk to each other—in word, thought, and practice—about the natural world and our relationship with it. We need to communicate the role individuals play through their actions and choices, and how their actions and choices impact the natural world. The only way to do this is to recognize that a natural area can take any form to anyone. By doing this we will make natural areas tangible in peoples lives. The connections natural areas can provide, the values they hold for all of us, and how we speak and act towards them must be strengthened for the sake of the natural world.

In the last few months, I have traveled to Port Douglas, Queensland, Australia; Omaha, Neb.; Richmond, Ore.; and Portland, Maine. Along the way I decided I would conduct an informal survey on natural areas in preparation for this essay. I asked people two questions: 1) What is a natural area? and 2) What would you find there? I was surprised by the responses of people as they related to me what they thought a natural area was and where they might find one. What I found most surprising was that responses varied by the person’s identity and location. A golfer’s response to the question was “the putting green.” A bar attendant’s response was “this place” and “these people.” Others replied, “this river we are floating on,” “my farm,” “a wilderness” or “a place where humans are not.” The response I thought was most applicable to this discussion



*Small creek flowing through Congress Park in
Saratoga Springs, N.Y.*

Adrian J. Brown

was “where I feel the most comfortable, like the stream at my parents.” What my informal survey did for me was to reinforce my belief that people associate “natural areas” with a multitude of places and that the “nature” in “natural areas” is a complicated cultural concept. How we talk interprets and defines what exists beyond us. If we, as conservationists, want more people to identify with designated natural areas then how we talk should be extended to include some of the examples people provided me in my survey. We must recognize that each “natural area” holds a message about how nature fits into our daily life and making nature a more salient feature of our daily lives.

My wife tells me stories about the inner-city children who pass through the ecology center where she works as they do their field investigations fulfilling the place-based education

Patrick Henry is said to have sounded a warning note very early in our history with the statement: “He is the greatest patriot who stops the most gullies.”

Werner O. Nagel, 1970, Conservation Contrasts

approach of the center. I cannot help but smile as she relates to me the children's authentic and unprogrammed direct experience with what they see as a particularly healthy and abundant natural area. It is these children and the people we meet day-to-day who are impacting the natural world. It must be made clear that everything we do bears a relationship to and has consequences for the natural world. We must foster the message that biodiversity captured in all natural areas enables the natural world to survive in adverse conditions and to prosper in good. The more species of animals and plants living in the natural world, the greater the collective strength of it to cope with periods of adversity. Currently, most actions we undertake simply reinforce the prevailing discourse about natural areas and our existence separate from them. We need to extend our thinking about natural areas to help this generation identify their actions toward them. In ascribing value and worth (I do

not mean commodification) to the full spectrum of natural areas and all the elements occurring within them, we will transcend the denigrating current message of personal irrelevance relative to it and shift the recognized human role within the larger biotic community. More and more, the primary way this generation constructs life experiences is through consumption. The voluntary action to choose to consume must be tempered by the awareness that the natural world provides us the resources of daily life. All of us must play a role in reconstructing relationships with the natural world, and the natural areas in our local landscapes, including Missouri natural areas, can help us communicate in word and practice our relationship with them. We are part of the generation that must mobilize in response to the burgeoning message of personal irrelevance to the natural world. For ourselves and future generations, we must become an effective unified voice in word, thought and practice. ▲

Report on the Recovery of Two Natural Areas at Johnson's Shut-Ins State Park

By Michael Currier, Natural Areas Coordinator, Missouri Department of Natural Resources

On Dec. 14, 2005, the AmerenUE Taum Sauk Reservoir failed sending a torrent of 1.3 billion gallons of water 600 feet down Proffit Mountain into a 1-mile tributary of the East Fork of the Black River. It removed trees, vegetation, and soil down to Cambrian and Pre Cambrian bedrock. It carried with it igneous boulders the size of tractors, large slabs of Bonne Terre dolomite, pieces of the reservoir wall tumbled into smooth cobbles of "concrete-onite," giant twisted "balls of yarn" fashioned from 1-inch thick rebar, thousands of broken and splintered trees, and over 200,000 tons of sands and sediments. This churning slurry cut and ground its way across and through the valley occupied by the East Fork of the Black River, severely impacting the stream and its aquatic faunal community. The surge continued downstream through two state-designated natural areas. It pulled trees and vegetation from the ground deforesting 50 floodplain acres. And in large areas it removed the organic soil layer exposing the roots of wetland shrubs in its wake. As it met the constriction formed by the shut-ins, a temporary backwater lake formed. Gravel wash, streambank, riverfront forest, bottomland forest, and forested fen terrestrial natural communities were smothered by boulders, cobbles, sediments and debris. Two state-designated natural areas were heavily damaged.

Natural areas are defined as biological communities or geological sites that preserve and are managed to perpetuate the character, diversity and ecological processes of Missouri's

native landscapes. The best example of each community type (terrestrial and aquatic) or geological feature are represented in our system of natural areas. Agencies represented by the Missouri Natural Areas Committee (MONAC) specify that the natural areas which they designate represent the highest and best use of these tracts.

Johnson's Shut-Ins Natural Area, 180 acres in size, includes a volcanic rock shut-ins (*geologic feature*), Ozark Small River (*aquatic faunal community*; Pflieger, W.L. 1989), and gravel wash (*terrestrial natural community*; Nelson, P.W. et al. 2005). The area was protected in part by the constriction of the flood plain at the shut-ins, and the igneous rock shielding which dissipated the energy of the raging waters. As floodwaters tumbled over the boulders, its down-cutting force deepened the pools below. Rows of trees were removed where it lapped high upon the east side of the river corridor. Large amounts of silt and debris were deposited in and adjacent to the shut-ins. The popular "bath-tub" pools frequented by swimmers filled with gravel, sediment and debris. As high water winded its way downstream and receded, the fine silts left behind covered stream edge communities, leaving open habitats for pioneering plants.

In the cleanup effort helicopters removed over 180 tons of rock from the shut-ins. Several more tons were removed by hand. Today the signature rock features exhibit minor damage, with no rocks broken. The more obvious signs of change are

fewer trees, the deeper pools below the shut-ins, and sediment deposition. Through time the aquatic faunal communities will recover, and the sediments will be stabilized or move downstream during normal flood events. However, there is concern that invasive exotic species like sericea lespedeza (*Lespedeza cuneata*) will become established throughout the stream corridor in and below the shut-ins.

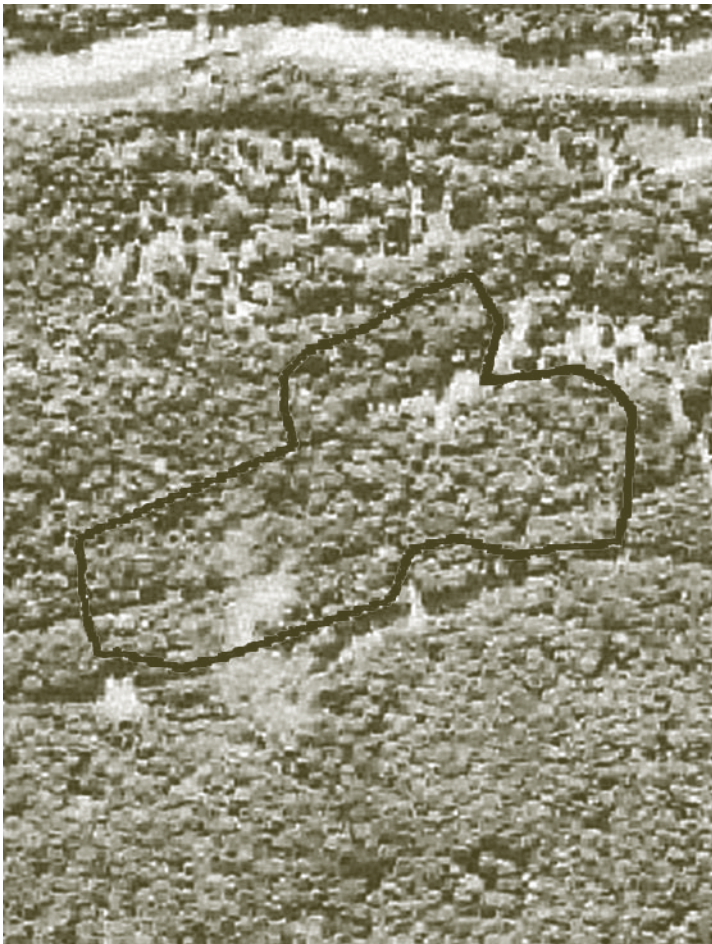
Johnson's Shut-Ins Fen Natural Area, 8 acres in size, features a forested fen (*terrestrial natural community*). Prior to the event it had a canopy of red maple (*Acer rubrum* var. *drummondii*), green ash (*Fraxinus pennsylvanica*) and slippery elm (*Ulmus rubra*), with a groundlayer of grasses, sedges and perennial forbs; or shrubs, mosses and sedges depending on hydrology, soil depth and other factors.

Lacking the protective rock shield of the shut-ins, the natural area was severely damaged by the event. Trees were removed from 6.5 acres leaving less than a half-acre partially forested. Over much of the area the upper organic layer of soil was removed, and replaced with sand and silt from 1-3 feet in depth. At the south end of the natural area a protected section retained its organic layer, but was buried under 1-1.5 feet of fine silt.

Fens are rare wetland communities created by groundwater seepage. In the Ozark Highlands they occur where groundwater

meets an impervious rock stratum and moves laterally to a seep zone on the sideslopes of hills in narrow valleys, or along terraces of streams and rivers. As water circulates through dolomite bedrock it becomes saturated with calcium and magnesium. Soils are continuously saturated by cool mineralized groundwater. They often have a distinct dark rich upper organic layer. Plants adapted to fens in Missouri include orange coneflower (*Rudbeckia fulgida* ssp. *umbrosa*), cowbane (*Oxypolis rigidior*), and Northern Pleistocene relict species like the hooded violet (*Viola cuculata*). Fens support a disproportionate number of state-listed and conservative species given their small size in comparison to other community types such as glades or woodlands. They are preferred habitats for a number of uncommon insects, amphibians and plants. For these reasons they have high conservation value.

The Missouri Natural Heritage Program lists forested fens as imperiled in Missouri with only six significant sites identified. In the St. Francois Knobs and Basin Subsection of the Ozark Highlands two significant examples occur, with Johnson's Shut-Ins Fen the only site in public ownership. In 1983, it was designated as a state natural area. Recognizing this, the effort to restore the fen was initiated in January 2006, as part of the settlement agreement between AmerenUE and the State of Missouri. The winter dormant season provided a



An aerial view of Johnson's Shut-Ins Fen Natural Area (outlined) pre-event (left) and post-event (right).
National Agricultural Imagery Program

On a recent Sunday, I patrolled three easily accessed Shannon County natural areas: Blue Springs, Powder Mill Cave and Prairie Hollow Gorge. Seeing license plates from Florida, Illinois, Kentucky, Ohio, Oklahoma, Michigan and Texas at these areas reminded me of how mobile a society we've become. It's wonderful that we're so easily able to visit wild places across our nation, but with that ability comes a responsibility for those areas. Visitors have introduced, sometimes intentionally and sometimes unintentionally, many organisms into areas where they were not previously found Dedicated just a few minutes to ensure that the integrity of these special places is not compromised means they will still be here to be enjoyed by the next generation. That is a goal worthy of all our concern. I feel very fortunate to have as my area of responsibility the county that has the most designated natural areas in the state. I have visited every one of them and take their protection seriously. What a great way to make a living.

Conservation Agent Brad Hadley in "Agent Notes," *Missouri Conservationist*, September 2007, and personal communication with the editor

window of opportunity for sediment removal with the least amount of damage to wetland plants and animals.

Dennis Meinert, soil scientist with the Missouri Department of Natural Resources' Soil and Water Conservation Program, provided a detailed map of sediment depths throughout the natural area. Crews were hired using shovels, a 10-foot tall industrial vacuum mounted on a three-axle trailer, and backhoes on swamp mats to physically remove sand and silt down to the native soil layer. The work proceeded carefully but speedily to complete the work before spring green up. Roughly 15,000 tons of sediments were removed from the natural area. A plan for monitoring fen vegetation was developed by MACTEC Inc., the consulting firm hired by AmerenUE to coordinate all aspects of the restoration at Johnson's Shut-Ins. The plan, which will track the success of the recovery effort, was approved by the Department of Natural Resources. Lacking pre-event data, monitoring provides a baseline against which to assess recovery over time.

One method of analysis used to assess monitoring data is the Floristic Quality Assessment (FQA) program. FQA assesses the quality of a community (or area) based on coefficients of conservatism. It is used in Ohio, Michigan and other states for mitigation and conservation purposes. The coefficients represent two basic ecological principles: that plants differ in their tolerance to disturbance type, frequency and amplitude; and they display varying degrees of fidelity to habitat integrity. Each plant is assigned a number (CC-Value) from 1 to 10 reflecting these principles (Ladd 1993). The average coefficient

of conservatism for all plant species allows for comparison with other sites. Based on the initial year of data collection, Johnson's Shut-Ins Fen yielded 3.6 species per plot with an average CC-Value of 3.61. Values for other fen natural areas, for which monitoring data are available, are shown in the table below.

Site	Species/ Plot	Average CC Value
JSI Forested Fen NA (total area)	3.6*	3.61
Coakley Hollow Ozark Fen (deep muck)	10.6	4.85
Coakley Hollow Ozark Fen (bedrock seep)	10.8	5.57
Grasshopper Hollow Prairie Fen	10.1	6.16
*Calculations are based on fall sampling period.		

Looking at the number of "conservative species" pre- and post-event is another way to assess change. The pre-event species list for Johnson's Shut-Ins Fen included 37 species that are "conservative" (or with CC-Values, 7 through 10). In contrast the post-event list has 15 conservative species.

These results describe the starting point of an evaluation process. It is encouraging that conservative species like closed gentian (*Gentiana andrewsii*), sweet William (*Phlox maculata* ssp. *pyramidalis*), swamp lousewort (*Pedicularis lanceolata*) and ragged fringed orchid (*Platanthera lacera*) have reappeared, although in lower numbers than before. Of greater concern is the integrity of the forested fen community. Will it recover?

The questions asked by those responsible for maintaining a viable Missouri Natural Areas Program are: Does Johnson's Shut-Ins Fen Natural Area continue to have a high-quality forested fen natural community? If so is it the best example in the St. Francois Knobs and Basin Subsection of the Ozark Highlands? Or has it been irretrievably damaged to the point that delisting of the natural area should be considered? These are questions for which there is not yet a clear answer. We do know that a specialized wetland community that has persisted for hundreds of years was severely damaged in a matter of minutes. The focus of the Department of Natural Resources is to evaluate this rare community, with the hope it can be restored. This assessment will require many years. ▲

Ladd, D.M. 1993. *Coefficients of conservatism for Missouri Vascular Flora. The Nature Conservancy, St. Louis, Mo.*

Nelson, P.W., et al. 2005. *The Terrestrial Natural Communities of Missouri, Revised ed. The Missouri Natural Areas Committee, Jefferson City, Mo. 550 pp.*

Pflieger, W.L. 1989. *Aquatic community classification system for Missouri. Aquatic Series No. 19. Missouri Department of Conservation, Jefferson City, Mo.*

Whetstone Creek Natural Area – An “At Risk” Aquatic Gem

By John George, Wildlife Management Biologist, Missouri Department of Conservation, and Scott Voney, Fisheries Management Biologist, Missouri Department of Conservation

Based upon the collection experience and wisdom of Bill Pflieger, retired MDC ichthyologist, Whetstone Creek in northeast Callaway County was suggested as a potential aquatic natural area in 1977. The nomination was finalized and accepted in June 1983. Whetstone Creek is a small, 4th order, highly productive Ozark border stream consisting of short, well-defined riffles and long, deep pools. It drains into the Loutre River about 12 miles east of the natural area. The largest pools are over a quarter of a mile in length, 40 feet in width and 6 feet in depth. The principal substrate is rubble in riffles and sand-silt in pools. Bars of chert gravel and sand occur on the inside of bends. The banks are mostly bedrock or sand and up to 10 feet in height.

The aquatic flora commonly consists of water willow (*Justica americana*) and spike rush (*Eleocharis* spp.). Whetstone Creek supports a diverse fish population of at least 34 species with a standing crop of large fishes in the range of 233 to 626 pounds per acre. The principal species of large fishes are gizzard shad, common carp, carpsuckers (river and quillback), white sucker, big mouth buffalo, golden redhorse, yellow bullhead, green sunfish, bluegill, longear sunfish and largemouth bass. The predominant small fishes are central stoneroller, bigeye shiner, red shiner, redbfin shiner, bluntnose minnow, brook silverside, striped fantail darter and orangethroat darter. The blacknose shiner (*Notropis heterolepis*) is listed as an imperiled species in Missouri and is found in small tributaries of Whetstone Creek and occasionally within the main stem of Whetstone Creek. Among Missouri streams, Whetstone Creek is quite diverse, significant in that it lies north of the Missouri River where streams are often much less diverse than those south of the river. Whetstone Creek provides quiet pools having considerable amounts of aquatic vegetation and bottoms of muck and organic debris, favored by the blacknose shiner.

The portion of the creek and the floodplain that are in the Whetstone Creek Natural Area consists of 127 acres entirely within the boundaries of the Whetstone Creek Conservation Area. Smaller streams that feed Whetstone Creek occur both on and off the conservation area. Appling Branch is almost entirely contained on the south end of the area while Heat String Creek is entirely outside. Only about 14 percent of the watershed for the creek is on public land with the remainder in private ownership. Area

managers at Whetstone Creek have decreased crop acreage in the floodplain and increased the forested corridor for the stream. Additionally, in November 2000, two interior road stream crossings on Whetstone Creek were stabilized by installing reinforced light equipment crossings. These crossings were installed to reduce sediment from entering into the stream while crossing in addition to providing a stable crossing year around. In February 2003, two cedar tree revetments (42 trees total) were installed on Whetstone Creek proper to help stabilize the toe of the stream bank. These revetments slowed down the erosion process and helped establish a healthy, wooded riparian corridor along the erosion site.

As management of the natural area and the acreage around it continues to improve through time, our concerns switch to those actions occurring within the watershed but outside of the conservation area. We feel that the biggest threat to the biodiversity within the natural area occurs outside our boundaries. Pflieger (1997) noted that the blacknose shiner seems especially vulnerable to extirpation by pollution and other catastrophic events. In 1996 an approximately 70,000-hog commercial farm was constructed about a half mile upstream from the natural area. To date there have been no known incidents from the commercial farm, but it has to be recognized as a significant threat due to its close proximity. In 1997 the Missouri Department of Transportation graded and reshaped the upper reaches of Whetstone Creek where it passes under Interstate 70. This action resulted in some information sharing between MDC fisheries biologist and MoDOT engineers, but it also points out how even accidents and land disturbances up on well traveled I-70 could result in accidental spills or increased sedimentation into the watershed.

As we continue to get to know our neighbors and maintain good relationships with them this may help us to buffer threats and accidents. We continue to do this through our private landowner incentive programs for land management and we encourage that any land disturbances follow Best Management Practices. Other considerations could be starting a Stream Team for monitoring both within and outside of the natural area. An increase in educational information about what effects local stream water quality could also help. In the end, our success or failures will come



Quiet pools on Whetstone Creek provide critical habitat for the blacknose shiner.
Whetstone Creek by John George, blacknose shiner by Nebraska Game and Parks Commission

from what positive aspects we can have on our neighbors who own the vast majority of the watershed for the natural area. Working with neighbors and encouraging BMPs is a continual effort with landowner changes and changes in agricultural practices.

Cranes Country Store in Williamsburg is a very famous stopping spot for many Missourians. People visit the store to enjoy the antiques and to experience the old general store format. Many others like to stop to get one of their famous \$1 sandwiches. The next time you are visiting the store bring a fishing pole and drive north on Callaway County Road 1003 about 2 miles where you will find yourself at the

Whetstone Creek CA campground. A 1/4-mile trail leaving the campground to the north will lead you through a nice woodland where you can enjoy the wildflowers on your way down to the Whetstone Creek Natural Area where you can have some fun fishing the larger pools. ▲

Pflieger, William L. 1997. The Fishes of Missouri, revised edition. Missouri Department of Conservation, Jefferson City. 372 pp.

Tree Rings: Natural Areas Historians

By Richard Guyette, Rose-Marie Muzika and Michael Stambaugh, Professors and Research Associate at the University of Missouri, Department of Forestry

Introduction. There are many links between dendrochronology, the study of what the tree rings tell us, and Missouri natural areas (Guyette 1978). At the University of Missouri's Tree Ring Laboratory (MTRL, <http://web.missouri.edu/~guyetter/>) in the Department of Forestry, the "language" of tree rings is used to study forestry, environmental history and forest ecology. Because Missouri natural areas represent unique and sometimes rare communities, they contain a rich natural and human history that can be documented by measuring, counting and analyzing the rings of trees.

The Age of Trees. One of the most basic questions in both natural area nominations and research is: "How old are the trees?" It is critical to remember that a tree size often belies its age, and rarely are big trees the oldest. Taking a pencil-sized core from most trees will do little damage and provide a true age estimate. Some examples of the age of trees in Missouri natural areas include a 500+ year-old eastern redcedar (*Juniperus virginiana*) at Vilander Bluff and 320+ year-old white oaks (*Quercus alba*) at the Current River Natural Area. The stem ages of American smoke tree (*Cotinus obovatus*) at the White River Balds Natural Area are as old as 250+ years.

The dominant shortleaf pine (*Pinus echinata*) at the Pioneer Virgin Pine Forest are about 210 years, at the Alley Spring Natural Area about 280+ years, and at the Eck Memorial Tract the oldest pines are about 300 years. Many natural areas such as Allred Lake have very old trees, but they are also very hollow trees. Some of the dead wood at Allred Lake indicates that some bald cypresses (*Taxodium distichum*) there are over 800 years old. Redcedar has some of the most extreme differences in size versus age with 400 year old trees no more than 5 inches in diameter and 30 year old trees more the 12 inches in diameter.

The History of Fire. Documenting the history of fire in and around natural areas provides important information for their management. Using dated fire scars on dead wood, old stumps and trees, a 350-year-long record of fire has been determined for many natural areas that is linked to changes in human population, culture, topography and climate. The rich history of wildland fire in Missouri has contributed greatly to our understanding that humans have played an integral role in shaping ecosystems for thousands of years. Several natural areas have yielded globally significant data, which is available at The International Multiproxy Paleofire Database, http://www.ncdc.noaa.gov/paleo/impd/impd_data_intro.html. Fire history study sites on Missouri natural areas include Mill Mountain, Blue Spring (Guyette *et al.* 2002), Big Spring Pines (Stambaugh *et al.* 2005), Caney Mountain (Guyette and Cutter 1991), Boyds Creek near the Sunklands (Guyette and Cutter 1997), and the Brickyard Loess Hill Mound (Stambaugh *et al.* 2006).

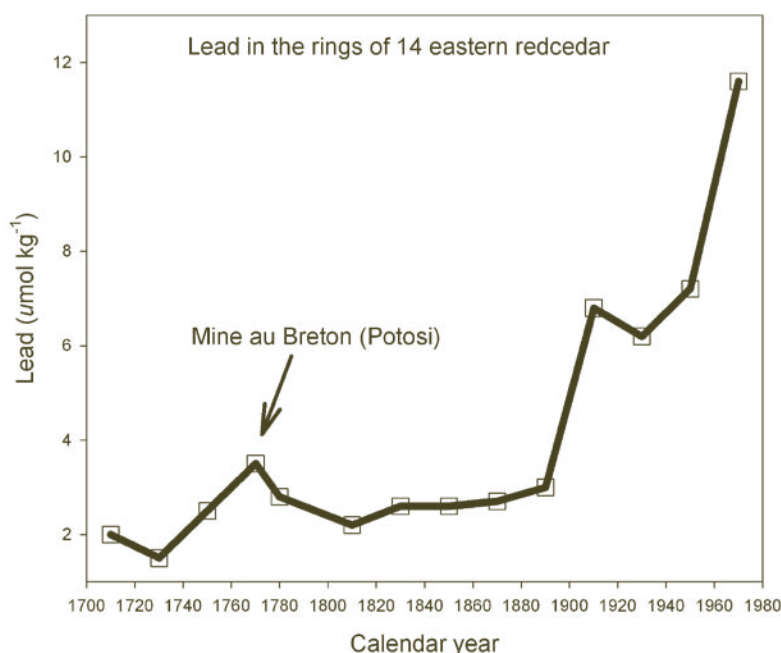
Soil and Atmospheric Chemistry.

Early Euro-American mining and smelting in southeastern Missouri was one of the first "unnatural" technologies to cause wide spread changes in environmental chemistry. The Hughes Mountain Natural Area owing to its elevation above the surrounding landscape, its naturally acidic and shallow soils, and its well-preserved old trees is an ideal location for the study of early pollution (Guyette *et al.* 1989, Guyette *et al.* 1991). This rhyolite mountain top harbors old and chemically sensitive redcedar in the early lead belt (10 miles from Mine au Breton which was active near Potosi circa 1770). Cores from these cedars provided a 300-year chronology of lead pollution.



These two shortleaf pine trees show the fast growth of a dominant canopy tree (19 rings) compared to the slow growth of an understory pine (45 rings).

University of Missouri, Mike Stambaugh



Redcedar cores provide a 300-year chronology of lead pollution at Hughes Mountain near Mine au Breton (Potosi) in the old lead belt.
University of Missouri, Rich Guyette

The Natural Areas Connection with Architectural History. Ring-width chronologies and patterns from live trees are used in the dating of historic log cabins. Tree ring chronologies from trees in Missouri's natural areas are publicly available world wide at The International Tree-Ring Data Bank, www.ncdc.noaa.gov/paleo/treering.html. In addition to the dating of human artifacts, these chronologies provide valuable data for studies of drought and global climate change. Of particular value for dating are chronologies of white oak (Current River Natural Area, Babler Southwoods Hollow Natural Area), shortleaf pine (Pioneer Virgin Pine Forest, Alley Spring Natural Area), and eastern redcedar (Vilander Bluff). Historic houses in Missouri that have been tree-ring dated include Van Horns Tavern (1829), the Amoureux House (1790), the Delasuss House (1794), the St. Gemme Vital Beauvais House (1790), and the Green Tree Inn (1790).

Insects and Oaks. Several sites in the Ozarks (e.g. *Quercus* Flatwoods Natural Area) have been used to date past outbreaks of red oak borer (*Enaphalodes rufulus*). The timing of red oak borer attacks can be precisely dated and is attributed to the age of even-aged forests and changes in temperature (Muzika and Guyette 2004). Historically, borer populations likely were limited by the mixed-age distribution of host tree species, however tree-harvest practices at the turn of the 20th century resulted in extensive tracts of even-aged red oak host species. The interaction of stand age and warming temperatures may be providing improved conditions for oak borers.

Shortleaf Pine Forest Ecology. Restoration of shortleaf pine in the Ozarks is aided by knowledge of historic

ecological processes. Tree-ring studies in natural areas of Missouri have shown that the natural regeneration of shortleaf pine in Ozark forests has been diminishing for many years due to changes in forest disturbance regimes. Studies of pine regeneration in old growth forests have been conducted at the Eck Memorial, Big Spring Pines, and Alley Spring natural areas. These studies indicate that relatively infrequent and small-scale disturbance events (e.g. windthrow, patch mortality) are inadequate for sustaining continued pine recruitment and suggest more frequent or severe disturbances, like those that occurred in the distant past, may be needed (Stambaugh *et al.* 2002). ▲

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Every day, Big Spring carries 173 tons of dissolved dolomite bedrock.
National Park Service

Ozark Springs— Their Geophysiography and Ecology

By Victoria Grant, Ozark National Scenic Riverways,
National Park Service

A significant part of the water pouring from Big Spring has recently been found to be as much as 200 years old (Imes *et al.* 2007). It fell as rain in the Current River region about the same time Thomas Jefferson was president and Lewis and Clark embarked on their Journey of Discovery. This recent finding highlights that in many ways our knowledge of these scenic Ozark springs is relatively cursory. What else don't we know about them? Surprisingly, many springs within the Ozarks are not well studied and much work remains to be done in terms of their hydrology and ecology.

The Ozark Plateau in southern Missouri and northern Arkansas is an ideal setting to produce both the very large, as well as the numerous smaller springs found there. Most springs are located south of the Missouri River, where soluble carbonate rocks dissolve through time and conduct water through cracks, fissures and conduits to emerge at the ground surface. This mature karst landscape is nationally significant, supporting in places a spring system that has been described as “world

class and unparalleled in North America” (USGS 1997). For example, over 420 springs have been mapped to date within the Ozark National Scenic Riverways alone, along about 100 miles of the Current and Jacks Fork rivers. Over 80 percent are found within Eminence and Gasconade Dolomites, though numerous springs from the Potosi Dolomite and Roubidoux Formation are also known.

In the Ozarks, conduits feeding the springs are produced by both top-down (through gravity flow) and bottom-up (through artesian pressure) ground-water flow. It is this artesian process that has produced the large, scenic springs for which the area is known. These include Big, Greer, Blue and Alley springs. Divers with the Ozark Cave Diving Alliance (OCDA) have mapped over 3,500 feet of the underground conduit that feeds Alley Spring, a component of the newly established Alley Spring Natural Area. On behalf of United States Geological Survey (USGS) geologists, OCDA divers retrieved rock samples from the spring conduit walls, which were used to

help understand how large springs along the Current and Jacks Fork Rivers were formed. As it turns out, ground water under artesian pressure from below is welling upward, dissolving rock along bedding planes and other fractures to produce conduit pathways—sometimes impeded in upward movement by more resistant sandstone layers, but often breaking through, to finally emerge at the ground surface as springs (Orndorff *et al.* 2006). An interesting feature of these large conduit springs is the amount of material carried out in the water. For example, Big Spring carries 173 tons/day of dissolved dolomite bedrock (Imes *et al.* 2007). Over one year, this would equate to a new passage about 11 feet wide, 12 feet high and 1 mile in length.

Recharged through vast stores of underground water, artesian springs are generally more constant in terms of flow, temperature and habitat conditions than their smaller, gravity-fed counterparts. The relative constancy of these moist, cool habitats has provided refuges for species now found much farther north. These glacial relicts with their disjunct populations provide unique opportunities for biogeographic studies. Examples include 30 chironomid midge species that are probable glacial/interglacial relicts (Blackwood 2001) and 10 species of plants restricted to spring waters (Steyermark 1941). In particular, star duckweed (*Lemna trisulca*) is imperiled within the state.

Springs are unique and specialized habitats, primarily due to cool temperatures and flowing water. Many species found in the spring outlet and springbrook either do not occur outside of springs (crenobionts) or prefer springs over other aquatic habitats (crenophiles). Examples include snails, amphipods, beetles, mites and flatworms. Although historically known as uniform in physical and chemical conditions, more recent studies are revealing a much more temporally dynamic system, both within and across springs. Though some species are relatively consistent components of spring biotas, it is more typical to find that each spring presents a unique set of conditions including flow, temperature regime, substrate and chemistry resulting in unique communities.

Spring environments are a continuum of habitats, connected to subterranean communities (stygiobionts) at the upstream end, continuing through its spring branch/brook, and finally modifying in both temperature and/or flow to lose its spring-like characteristics as it joins downstream waters (or dives back below the ground). Physically, chemically and biologically, this longitudinal heterogeneity supports a diverse spring flora and fauna, particularly as it changes from a relatively stable body of groundwater to more dynamic stream conditions. Temporally, springs are warmer than surface waters in the winter and cooler in the summer. They provide a thermal habitat buffer to stream or riverine species, as species move into them in the winter months and retreat again in the summer months.

Spring organisms are valuable as water-quality indicators of groundwater conditions. The National Park Service

has recently developed and initiated a unique large-spring monitoring protocol at Ozark National Scenic Riverways. The first of its kind in the nation, this protocol measures benthic macroinvertebrate communities, physical habitats and fish communities to track trends in spring health.

As noted, the water contributing to these springs comes from a mixture of different “ages” of water. Because of the mixture of new and old water, water quality of new, fast-flow recharge is important to the overall quality of spring flow. Surface activities which contribute contaminants to the groundwater through losing streams, sinkholes and surface infiltration can alter spring water quality and sediment load.

Due to the 3-D nature of karst landscapes and spring functioning, spring conservation is a holistic effort—similar in many ways to watershed conservation, except spring watersheds exist underground. Site-specific protection measures at the orifice and along the spring branch are also critical conservation actions, including maintaining buffer zones. Many of the large and small Ozark springs in Missouri are found within important Conservation Opportunity Areas (COAs) – the Meramec, Current River and Eleven Point COAs. These landscapes offer opportunities to educate both public land managers and private landowners on the vertical connectivity from the lands they manage to the impressive springs at the bottoms of their watersheds. This knowledge will help enable them to restore and sustain this unique and valuable natural resource. ▲

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Effectiveness Monitoring to Achieve an Ecological Goal

By Ronald J. Dent Jr., Resource Science Field Unit Chief, Missouri Department of Conservation,
and Mike Hubbard, Resource Science Supervisor, Missouri Department of Conservation

A new parcel of land has just been added to an existing land area under your responsibility. The area was purchased for a unique feature which could be a glade, savanna, spring, fen, etc. Eventually, you will have to develop a management plan for the new area that takes into consideration public use, management options and budgetary obligations. But your first thought is to get out there and start working on the habitat as soon as possible. So what do you do first? Do you start the chain saw, light a drip torch, or start hooking up the ATV sprayer?

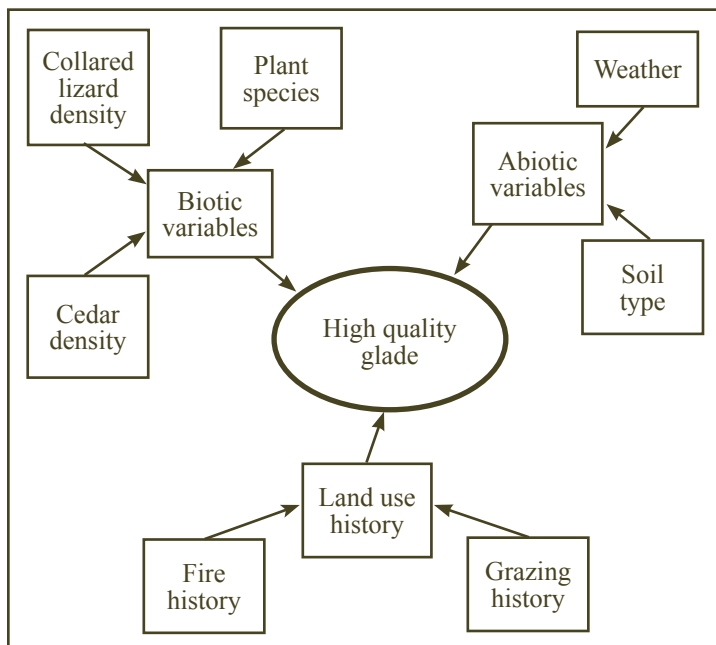
Most of us are action oriented. We see a problem, devise a solution and implement an action. That's just the way most of us are wired. However, this approach may not always lead to the best possible outcome, especially if there are numerous stakeholder groups (both internal and external to your agency) with various interests, concerned about the management of the new acquisition. These various groups often have a number of different desires for an area, which can sometimes be contradictory to one another. Consequently, answering a set of questions before you begin implementing your management may be the best approach to determining what treatments need to occur. Answering some of these questions before implementing any management activities may also provide strong biological support for your decisions. Some of the more important considerations include: Are there ecological processes in place to sustain the preferred outcome? What is the management objective for the area? Do the management goals reflect the desires of all stakeholders? How will you know if the selected management treatment will achieve the desired result? How often will the treatment be applied? At what time(s) of the year will the treatment(s) be applied? Which sites will be treated and at what frequency? Will other sites be affected by the treatment?

Effectiveness monitoring is becoming more common and is now required by a number of federal agencies. For example, the U.S. Fish and Wildlife Service originally required states to use effectiveness monitoring in association with the Comprehensive Wildlife Strategy and our State Wildlife Grants. The Forest Service is now requiring effectiveness type monitoring for its activities on both public and private land and it may be required by Congress for management activities associated with the new Farm Bill. Effectiveness monitoring is not stating how many acres will be treated, but rather it states the outcomes of that management action. In other words, it

defines success of the management treatment. The success of the management treatment can be defined by determining the important outcomes of an ecological system. On glades, for example, it is not the acres of cedars removed but perhaps an outcome of an increased number of collared lizards. For savanna management it is not the acres burned but maybe the diversity of plants resulting from that burn or the effect of the burn on forest products. In all cases, these important outcomes are reflections of some value-based decisions for which there are no wrong (or most correct) answers. Consequently, to determine management success, effectiveness-based monitoring needs to be implemented.

What does effectiveness monitoring entail? Basically it entails getting stakeholders (managers, NGOs, private individuals, corporate entities, etc.) together in a collaborative meeting to discuss and agree on answers to the questions provided in the first paragraph. The manager of the area may wonder why a group is needed to discuss the management objective(s) for the area. We may assume that everyone associated with or interested in this area agrees on the management objectives. But do they? Are we certain that the management treatment will result in emulating the natural process that we believe is required to sustain this particular community type at a certain level? Is there agreement among managers related to a visual image of what the area will look like after the management treatment is applied for a given length of time? In many instances managers might be able to agree on the treatment (i.e., cutting, burning etc.), but may disagree on the desired outcome or state of the community after the treatment(s). Once everyone agrees on the uncertainties associated with the management activities, the manager can begin the development of a set of variables to monitor both before and after the treatment to inform these uncertainties and learn, in a structured fashion, from their actions.

The first step is to define the management decision (which may be revisited during the year, several times throughout the year, or across multiple years). In the example of glade management we might predict that by cutting a certain number of acres of cedars from the glade that the number of collared lizards will increase by some factor within a specified period of time. As we think about our outcomes (e.g., the number of collared lizards resulting from the management), a simple pictorial model of the system will allow stakeholders to agree on those natural processes that might have the most effect(s) on



A simplistic model of biotic, abiotic and land use components on a glade community.

Ron Dent and Mike Hubbard, Missouri Department of Conservation

the habitat and drive the system to emulate the vision identified by the various stakeholders.

A model will help identify uncertainties to measure or monitor in order to evaluate the success of the selected management option(s). The monitoring design does not have to be complicated, time consuming or expensive. In fact the more definitive the objective, the less information needed to inform the uncertainty associated with the management. Once this information is collected, it needs to be archived for use by future managers. The real value of gathering monitoring data is using it to revisit the model and ask if the management prediction is still valid. By revisiting the model and using the information collected to inform uncertainties, managers will have a better sense of what changes in their management decision they might make to better achieve their stated objectives (Williams 1982, Walters 1986).

A case study will make the utility of ecological monitoring more apparent. "Effects of Fire on Glades and Woodlands at Caney Mountain Conservation Area" was conducted by Rhonda Rimer, natural history biologist for the Missouri Department of Conservation. Rhonda's management objectives were to maintain and enhance the diversity and abundance of native plant species, reduce woody encroachment on the glades, and to enhance the woodlands on a 1,330 acre restoration area (Rimer 2004). The management prediction was that the increased frequency of prescribed fire would reduce survivability of overstory tree species by 25 percent, decrease the understory (sapling abundance) by 25 percent and increase plant species diversity. Data collections over a 3-year period indicated that fire was a useful tool for reducing saplings numbers; however the objective of a 25 percent reduction was not met. Fire did

improve plant species diversity and floristic quality, but it did not result in significant mortality to overstory trees (primarily post oaks). These data helped the manager recognize that fire alone may not achieve the desired reduction in woody overstory and understory, and that other management treatments (i.e. silvicultural) were needed to achieve the management objective, or that a 3-year time frame was insufficient. The other lesson learned by the management evaluation was that prescribed fire was not interfering with other management objectives for the area (production of forest products).

By understanding if management treatments are moving a system or habitat toward a stated objective, both time and money should be saved. Perhaps the most significant lesson learned from an evaluation lies in the satisfaction of knowing that the hard work put into restoring a unique community was effective at achieving the stated goal. In addition, everyone learns more about the ecological processes that drive the system.

The amount of time spent upfront in developing a sound monitoring plan will more than offset the amount of time that may be spent trying to undo a management prescription that is incompatible with the ecological processes already in place. A well thought out monitoring plan often results in an increase in personal satisfaction for the manager and can lead to more effective and better informed decisions related to management actions. A side benefit of a monitoring plan is often the collaboration among stakeholders and the satisfaction of knowing that often several management objectives can be met with the prescribed treatments. In some cases managers will realize that there are trade-offs in management; certain species, communities or habitats may be improved while others may be adversely impacted. These trade-offs are sometimes the greatest sources of uncertainty and can result in conflicts among resource managers and the public. Identifying and agreeing on desired outcomes up front can reduce potential conflict after a treatment has been applied. Managers can no longer afford the lost time and financial costs of conducting habitat manipulations without using effectiveness monitoring as a roadmap to success. A key to success in ecological restoration efforts will be the manager's ability to document community changes by explicitly including stakeholder input, defining management goals and developing management treatments, monitoring the results and passing on the lessons learned to other managers and iteratively assessing the goals of the restoration effort with the stakeholders. ▲

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Working Across Fences: Partnerships in Natural Community Management

By Justin Johnson, Executive Director, Missouri Prairie Foundation

Recognizing that rare natural communities, such as tallgrass prairie and oak savanna, do not always stop because of physical or legal boundaries, the Missouri Prairie Foundation (MPF) has always tried to work with neighbors and other partners to manage natural communities across a broad landscape.

At MPF's Golden Prairie in Barton County, the original 320-acre prairie remnant is complemented by more than 300 acres in varying states of restoration that MPF has acquired. Just as important, a 480-acre tract owned by neighbor Roberta Gilbreath is managed as part of a single 1,100-acre project area. The Gilbreath land had been grazed for many years and rarely burned, so the natural plant community was difficult to assess. Over the past five years, MPF has worked with the Gilbreath's cattle operator to manage the movement of the herd. The number of cow-calf pairs stayed constant, but instead of grazing only the Gilbreath property, the forage on the original Golden Prairie and the land being restored by MPF were made available to the cattle. A prescribed fire rotation was also put in

place. The combination of managed fire and moderate grazing has improved the plant community throughout the project area. It is now apparent that more than 100 acres of the Gilbreath prairie is of equal quality to adjoining Golden Prairie, which was designated as a National Natural Landmark by the National Park Service in May 1975. While Golden Prairie is not a part of the Missouri Natural Areas System, the high-quality of the natural community, including portions of the Gilbreath prairie, are worthy of consideration.

In June 2006, MPF acquired 80 acres of prairie in Dade County from Patrick Snadon. His mother, grandfather and great-grandfather had all served as stewards of the land, now called Coyne Prairie, since the 1880s. The property lies north of MPF's 160-acre Penn-Sylvania Prairie, but 80 acres in between the sites is still owned by Patrick's brother, Julian Snadon. Through a cooperative agreement, MPF will soon fence the entire 320 acres and institute a fire and grazing regime similar to the Golden Prairie plan. With the help of grants from the U.S Fish and Wildlife Service (FWS) and the

Missouri Bird Conservation Initiative (MoBCI), MPF has also cleared trees from adjoining private properties. Conservation professionals from MPF, FWS, the Missouri Department of Conservation (MDC) and the Natural Resources Conservation Service (NRCS) are collaborating to implement a number of restoration projects on public and private land in the area, which all lie within the Stony Point Grassland and Shrubland Restoration Initiative.

At Golden and Coyne, MPF Prairie Operations Manager Richard Datema is actively working to improve the natural community on and adjacent to MPF property. Board member Stan Parrish owns land adjoining MPF's Schwartz Prairie in St. Clair County, and he has managed the properties together for several years. With



Since fire and grazing have been reintroduced, early spring flora, such as Indian paintbrush and lousewort, has appeared on the high-quality Gilbreath prairie that adjoins MPF's Golden Prairie.

Justin Johnson

the introduction of light grazing, a population of *Geocarpa minimum* has been enhanced on the sandstone glade portion of the area, and a regular fire regime across the 320 acres encompassed by Schwartz Prairie and Parrish's property has produced sightings of an uncommon annual wildflower, prairie rose gentian, *Sabatia campestris*.

Within the 12,000-acre Mystic Plains Conservation Opportunity Area in Sullivan and Adair counties, cooperation is key. Only MPF's Runge Prairie, a 50-acre tract acquired in January 2006 and enrolled in a Grassland Reserve Program conservation easement, is permanently protected. Progress is slow, but many opportunities exist to restore degraded prairie and savanna communities by working with private landowners. At a board meeting in August 2006, MPF led a tour of the area that was attended by a few local families who together own more than 4,000 acres. One of the sites was the highly diverse Shoop Prairie, which is usually cut for hay each year. Last summer, MPF arranged a hay swap, whereby the Shoop family received an equivalent amount of hay in exchange for letting their prairie have a year of growth. In 2007, MPF hopes to continue the hay swap at Shoop Prairie and conduct a prescribed burn in either fall 2007 or spring 2008.

At another site just north of the Mystic area, MPF is working with agribusiness Premium Standard Farms (PSF) to convert more than 700 acres of tall fescue and row crops to native prairie grasses and forbs. MPF has a 10-year lease with PSF in which natural community restoration is the goal. A cooperative management plan developed by MDC, FWS, PSF and MPF calls for a mixture of high diversity native plantings, cool season grass and small areas of row crops. The project

should provide expanded habitat for greater prairie-chickens that persist on private land just one-half mile south of the property. Trees are being cut to open up the landscape and already a pair of prairie-chickens was spotted on the project area in spring 2006. MPF's work in the Mystic area is being funded by the Wildlife Habitat Incentives Program (WHIP), the Private Stewardship Grant program and a MoBCI grant. Due to the distance from MPF's one full-time land manager, the work is being carried out by contractors.

Increasingly, as its land management capacity is exhausted, MPF has been seeking opportunities to advise landowners on the long-term management of their private properties. Sometimes, that means leading by example. For more than 40 years, MPF has been driven by volunteers, many of whom are private landowners. Board members Wayne Morton, Bob Elworth and others manage high-quality prairie, savanna and glade remnants that they own. Board member Bruce Schuette is the park naturalist at Cuivre River State Park, where he helps manage noteworthy prairie remnants and large native woodland communities. Members such as Frank and Judy Oberle and Vincent and Jane Perna carefully nurture prairie on their private properties. Other members have simply converted their home landscaping to more native plants. Through articles in its *Missouri Prairie Journal*, postings at www.moprairie.org, and events such as the prairie restoration workshop held at Cuivre River State Park in October 2006, MPF aims to reach interested private landowners to give them simple natural community management advice that has been learned over the years. In a sense, the Missouri Prairie Foundation is a natural community of conservation leaders. ▲

Missouri Natural Areas Database

By Mike Currier, Natural Areas Coordinator, Missouri Department of Natural Resources

After several months of development the Missouri Natural Areas Database is ready for use by the Missouri Natural Area Committee (MONAC) and natural area managers. Constructed on an Access 2003 platform using visual basic computer language, it provides a ready source of information about the Missouri Natural Areas Program.

The prototype, developed by the Department of Conservation (MDC), was demonstrated to MONAC in January 2007. The Department of Natural Resources (MDNR) agreed to fund the completion of the project. It fulfills an objective expressed in the Memorandum of Agreement that defines and guides the program "to maintain records and documents, and provide public information."

Natural areas are natural benchmarks of ecological integrity and, combined, preserve key parts of our biological

and cultural heritage. MONAC has the responsibility of protecting this public trust. The database includes natural area nominations, maps and other pertinent information. It can be searched by ecological region, ownership, terrestrial or aquatic communities, or geologic features to generate lists of natural areas that satisfy selected attributes. It is a source of data that can be referenced by natural area managers as they work to restore natural landscapes, or to supply information to the public through website portals.

Agencies and organizations represented on MONAC will have copies of the database. It will be updated annually, with master copies retained by both MDNR and MDC, the agencies responsible for the administration of the program. The database is a useful tool that will enhance coordination of the program, and communication about the many values of natural areas. ▲

Natural Area Additions and Declassifications

By Mike Leahy, Natural Areas Coordinator, Missouri Department of Conservation

Two new additions to the natural areas system and one removal bring the count of designated Missouri natural areas to 181 totaling 63,039 acres. These areas were recommended for inclusion or declassification in the Missouri Natural Areas System by the Missouri Natural Areas Committee, MDNR and MDC agency directors and the Conservation Commission:

Star School Hill Prairie Natural Area addition, a 45 acre addition to the original 70-acre natural area contained within Star School Hill Prairie Conservation Area in Atchison County. This addition adds approximately 16 acres of exceptional quality dry loess/glacial till prairie, a rare natural community type. This prairie supports 11 state rare plant species.

Barn Hollow Natural Area addition, a 30-acre addition to the original 133-acre natural area contained within Barn Hollow Conservation Area in Texas County. This addition adds acreage of an exceptional quality, moist limestone/dolomite cliff and gravel wash natural community that supports populations

of two state rare plant species. The addition also contains Little Barn Hollow Cave.

Schell-Osage Prairie Relicts Natural Area declassification. This 48-acre natural area contained within Schell-Osage Conservation Area in St. Clair County was designated in 1975 and contains dry-mesic sandstone/shale prairie remnants in five separate tracts ranging in size from 3 to 15 acres. This site would not be considered for natural area designation today. It is too small and fragmented to adequately characterize a dry-mesic sandstone/shale prairie natural community in comparison to Taberville Prairie Natural Area (1,330 acres), which is just 3 miles away. After declassification, the prairies of the former Schell-Osage Prairie Relicts Natural Area will continue to be managed for the prairie resource and they do occur in the Taberville-El Dorado Prairie Chicken Focus Area. Declassifying Schell-Osage Prairie Relicts Natural Area will help maintain the strict quality standards of the natural areas system. ▲

Maintaining Integrity in Missouri's Natural Areas System

By Gene Gardner, Wildlife Diversity Chief, Missouri Department of Conservation

We are frequently asked, “Why would you ever want to remove a natural area from the natural area system?” Quite simply, our answer is “to maintain a high level of integrity in the ecosystems that serve as representative natural communities in the Missouri Natural Areas System (MNAS).” However, we should also offer additional insight into our reasoning. We should mention that the MNAS represents the very best examples of Missouri’s diverse assemblage of terrestrial and aquatic natural communities and geologic features. As such, Missouri currently has 181 natural areas that encompass over 63,000 acres of the highest quality natural lands in our state. An important fact to share is that only seven areas have ever been removed from the MNAS in the past 36 years. Some of these “de-listed” areas were among the first natural communities to be designated under that burgeoning philosophy, but their ecological significance (size and quality) now pales in comparison to other identical types of natural communities. As an example, the Schell-Osage Prairie Relicts Natural Area mentioned above was de-listed because the fragmented tracts no longer serve as the best representative dry-mesic sandstone/shale prairie natural community, especially since the 1,330-acre Taberville Prairie Natural Area (landscape) is just 3 miles away.

De-listing a natural area requires a formal process similar to a natural community that is brought before the Missouri Natural Areas Committee (MONAC) as a nomination for inclusion into the MNAS. Before any area is de-listed, MONAC asks some very important questions: Would the area be considered as a natural area candidate today? Is the area a statewide significant natural feature and are there better examples of that community type available for designation? What are the area manager’s and the coordination team’s recommendations regarding its de-listing? Before any natural area is de-listed, tough questions like these must be answered satisfactorily through MONAC’s formal evaluation process, taking into account current criteria and quality standards. Only those high-quality natural communities that meet the tough standards for the “best examples of a natural community type” will be included in the MNAS. This constant re-evaluation by Missouri’s professional natural community experts ensures high integrity in our Natural Areas Program and garners the continued support of public and private land stewards and partners throughout the state. By giving up these marginally significant areas, our proud heritage of protecting special, high-quality natural communities should continue well into the future. ▲



MISSOURI Natural Areas

Fall 2007

N E W S L E T T E R

Calendar of Events

Jan. 27—Feb. 1, 2008

**61ST ANNUAL MEETING OF THE SOCIETY FOR
RANGE MANAGEMENT JOINT MEETING WITH
THE AMERICAN FORAGE & GRASSLANDS
COUNCIL**

The Galt House & Suites, Louisville, Ky.

www.rangelands.org

Theme: Building Bridges: Grasslands to Rangelands

Jan. 30 – Feb. 1, 2008

MISSOURI NATURAL RESOURCES CONFERENCE

Tan-Tar-A Resort, Lake of the Ozarks, Mo.

www.mnrc.org

Theme: Get Ready for Change: Ensuring Resource
Sustainability in an iPod World

Feb. 13-16, 2008

**4TH INTERNATIONAL
PARTNERS IN FLIGHT CONFERENCE**

McAllen Convention Center, McAllen, Texas

www.partnersinflight.org

Theme: “Tundra to Tropics: Connecting Birds, Habitats and
People,” which will be shared with International Migration
Bird Day for 2008

Aug. 4-8, 2008

21ST NORTH AMERICAN PRAIRIE CONFERENCE

Winona State University, Winona, Minn.

<http://bio.winona.edu/napc/index.htm>

Theme: The Prairie Meets the River—the importance of
water in the prairie environment

Revised Natural Areas Program Brochure

A new Missouri Natural Areas Program brochure will be available for distribution this winter. This new brochure will be an update and revision of the last brochure, which was completed in 1998 and is out of print. New brochures will be great to stock at nature centers, state park visitors centers, ranger stations, refuge headquarters and other public contact offices. To obtain copies, please contact Michael.Leahy@mdc.mo.gov.



Missouri Department
of Natural Resources

*The Nature
Conservancy*



MISSOURI Natural Areas

N E W S L E T T E R

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Invitation from the editor: Readers are encouraged to send
comments about the *Missouri Natural Areas Newsletter* to
Wayne.Porath@mdc.mo.gov so that the newsletter can best
serve your needs.

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For a free copy of the *Missouri Natural Areas Directory*, write
to Mike Leahy, natural areas coordinator, at the address above.



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